



# ***AC Mini-Grids***

## ***Energy solutions for rural electrification***

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# 1. COMPANY PRESENTATION



## 1.1 mission statement

- SOLAR23 is a turnkey provider of on- & off-grid-connected photovoltaic systems and independent solar thermal systems with an international dealer network and customers in Europe and Africa. We cooperate with more than 30 partners in over 25 countries.
- In Africa and Europe, we are specialized in independent power supplies for telecommunications relay stations, rural electrification of villages, street lights, water pumps for drinking water and basic electrification of households. Our customers are private and industrial clients and development agencies such as WORLD BANK, UN, UNICEF, EU, FAO and GIZ's.

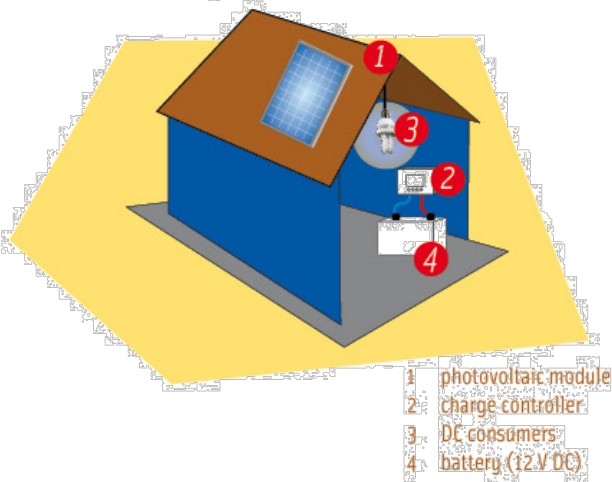
# 1. COMPANY PRESENTATION



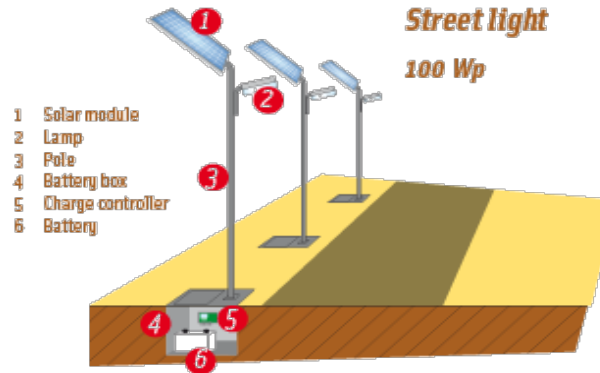
## 1.2 product range

### Solar Home Systems (SHS)

50 - 300 Wp

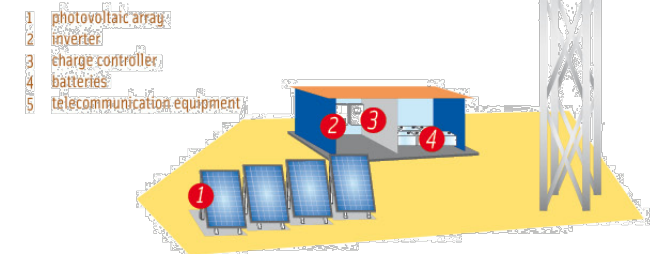


### Street light 100 Wp



### Power Supplies for Telecommunication Systems

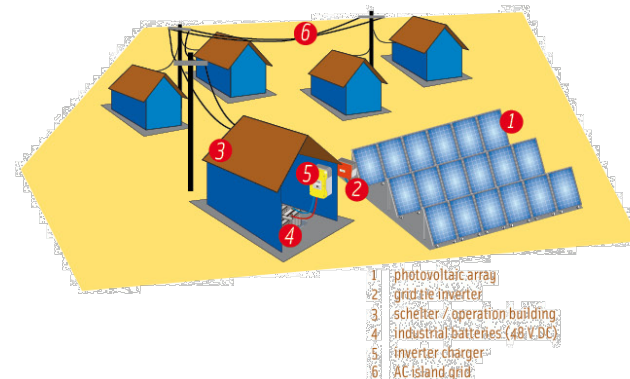
10 kWp



our products  
are systems

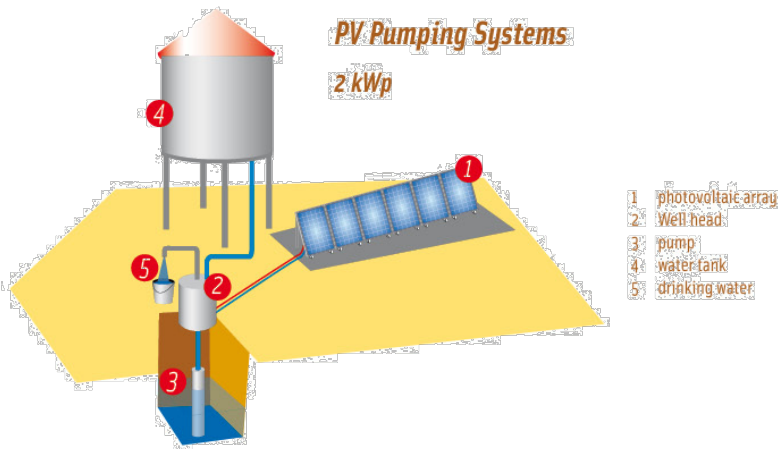
### Village Power supplies

30 kWp



### PV Pumping Systems

2 kWp



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# 1. COMPANY PRESENTATION



## 1.3 market area

### AFRICA

- ABIDJAN, Ivory Coast
- ACCRA, Ghana
- ADDIS ABABA, Ethiopia
- ALGIER, Algeria
- ANTANANARIVO, Madagascar
- ASMARA, Eritrea
- BUJUMBURA, Burundi
- DAKAR, Senegal
- JEDDAH, Saudi Arabia
- RIADH, Saudi Arabia
- JOHANNESBURG, South Africa
- KAMPALA, Uganda
- KINSHASA, Dem. Rep. Of Congo
- LAGOS, Nigeria
- LOMÉ, Togo
- LUSAKA, Zambia

### AFRICA

- LUSAKA, Zambia
- N´DJAMENA, Chad
- NOUAKCHOTT, Mauritania
- OUAGADOUGOU, Burkina Faso
- TUNIS, Tunisia
- YAOUNDÉ, Cameroon

### EUROPE

- ULM, Germany
- BOURDEAUX, France

### ASIA

- NEW DELHI, India
- KONYA, Turkey



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# 1. COMPANY PRESENTATION



## 1.4 reference customers

### > GIZ

ON-GRID / OFF-GRID System,  
Consulting support

### > FRES Netherland

Solar Home Systems, Delivery  
materials

### > WHO

Health supporting PV-Projects as  
f.ex. systems for vaccination cooling



> UNICEF Copenhagen  
pumping projects, Delivery materials

> GRET  
Multi-functional energy-providing  
Platforms, Delivery materials and  
Installation

> FAO  
PV Refrigerator Systems, Delivery  
materials

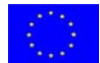
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# 1. COMPANY PRESENTATION



## 1.5 suppliers' pool

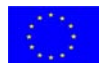
### > Solar modules



### > Electronic components



### > Solar pumps



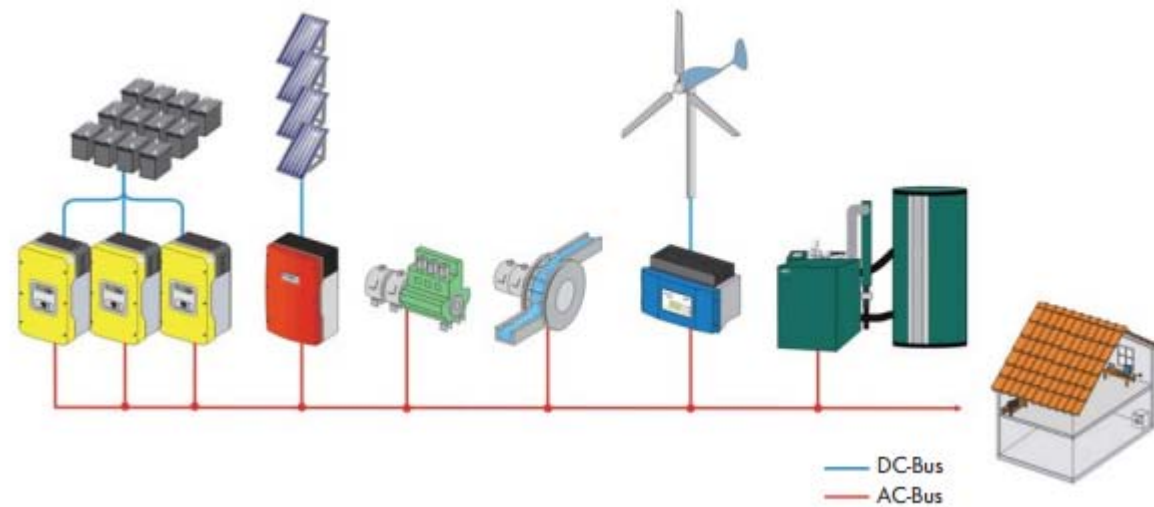
### > Batteries



## 2. TECHNOLOGY OF AC MINI GRIDS



### 2.1 AC bus systems



source: SMA



## 2. TECHNOLOGY OF AC MINI GRIDS



### 2.1 AC bus systems

#### *Advantages of AC coupling*

- Long distance distribution of 3 phase AC electricity into villages
- Compatible to public grid
- Easy to expand to 100kWp to 1MWp
- High reliability due to redundant & modular system design
- High efficiency during daytime use

#### *Disadvantages of AC coupling*

- Low efficiency during nighttime
- Conversion losses up to 30%

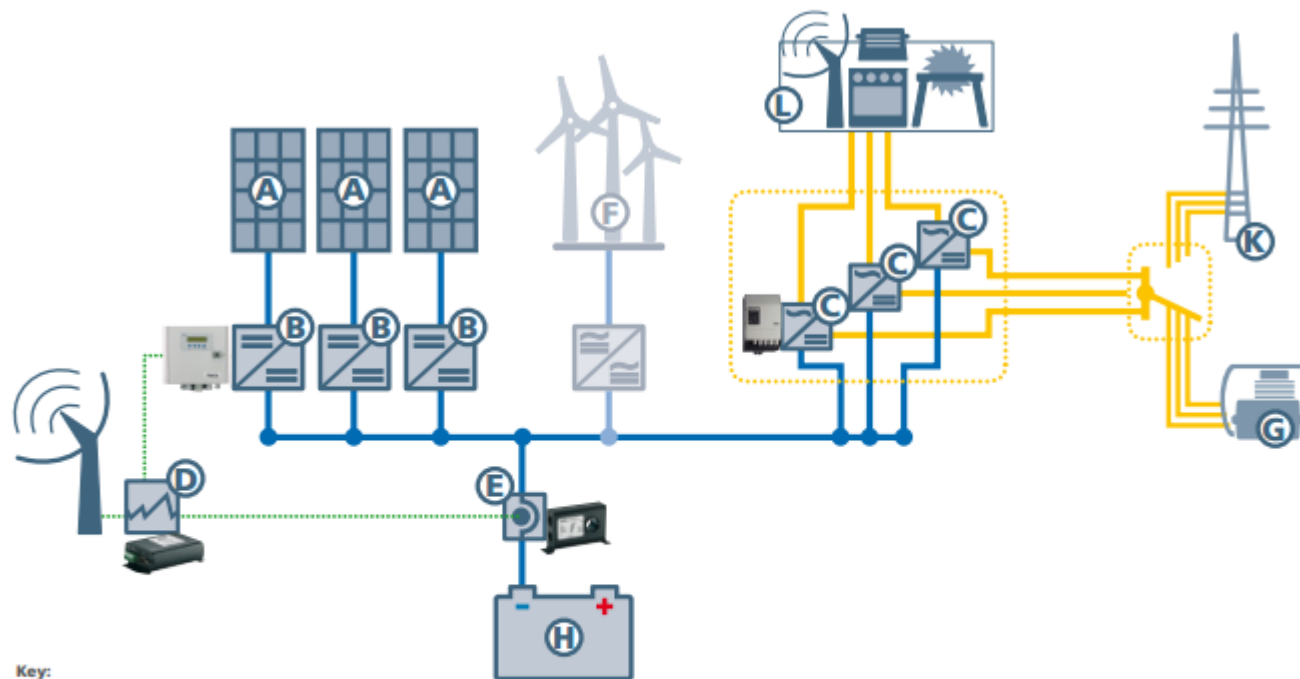


source: SMA

## 2. TECHNOLOGY OF AC MINI GRIDS



### 2.2 DC bus systems



Key:

- A Solar modules
- B Solar charge controller Steca Power Tarom
- C 3 Hybrid inverters  
Steca Xtender (XTS, XTM, XTH)
- D Data logger Steca PA Tarcom
- E Current sensor (shunt) Steca PA HS200
- F Wind turbines with inverter
- G Diesel generator
- H Battery
- K Public grid
- L Electrical load (400 V AC)

source: STECA & STUDER

## 2. TECHNOLOGY OF AC MINI GRIDS



### 2.2 DC bus systems

#### *Advantages of DC coupling*

- Easy to expand to 100kWp
- High reliability due to redundant & modular system design
- High efficiency during nighttime use

#### *Disadvantages of DC coupling*

- No parallel connection of battery banks
- Centralized installation point necessary for generators

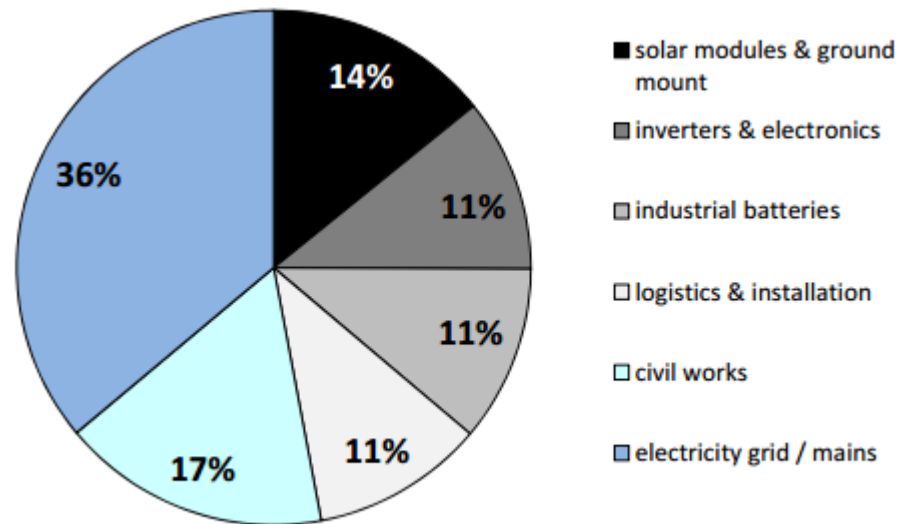


source: STECA & STUDER

## 3. FINANCIAL ANALYSIS



### 3.1 Cost break down



source: SNV Niger

## 3. FINANCIAL ANALYSIS



### 3.2 Electricity production cost

$$K_d = (A_o) \times [i(1+i)^n] / [(1+i)^n - 1]$$

$K_d$  = capital service

$A_o$  = initial investment cost

$i$  =  $P/100$  interest rate

$n$  = utilisation period

electricity production cost = 0,30€ / kWh  
(without grid)

source: SNV Niger

# SUMMARY



## ADVANTAGES OF MINI GRIDS

- reliable power if properly designed
- clean and silent power with photovoltaic power
- no air, soil and sound pollution to the environment
- modular and redundant design increases reliability (24H/24h – 7d/7d)
- easy to increase power generation capacity
- use of different auxiliary power sources possible (wind, diesel, hydro, grid)
- standards household appliances can be used (3 x 400/ 230VAC)
- management: users become subscribers with individual energy meters
- users do not need to pay investment in advance
- after sales service on one central place
- distributed power and no waste of electricity: households who do not consume power in the village can be used by other households



# IMPRESSIONS



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IMPRESSIONS

***SOLAR 23*** 



***POWER THE WAY TO SUSTAINABILITY***



# IMPRESSIONS



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***THANK YOU FOR YOUR ATTENTION!***

